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ABSTRACT

Hospital wastes pose a significant impact on health and environment. From this study it can be said that there is an urgent need for raising awareness and education on medical waste issues. Proper waste management strategy is needed to ensure health and environmental safety. For further study, it is needed to collect more information on impacts, disposal and management to draw clear conclusion. Biomedical waste management is one of the biggest challenges of the present day times because it has a direct impact on the health of human beings. Since it is hazardous in nature its safe and proper disposal is extremely important. For proper disposal management of biomedical waste the Ministry of Environment and Forests has published the Bio-Medical Waste Rules, 1998. This review explains the hospital waste management and the environmental problem in India. This study also focused on the problems associated with Biomedical waste. In the past, medical waste was often mixed with municipal solid waste and disposed in nearby landfills. In recent years, many efforts have been made by environmental regulatory agencies to better manage the biomedical waste. Need to collect information and examples from developed country or the country, which has sound medical waste management system. Find alternatives and appropriate technologies for developing countries. Need extensive study on this medical waste and its management aspects as well. All over the world, there is an exodus of people from villages to cities, partly for education and employment and partly because agriculture has become less and less profitable. It is estimated that 65% of the world's population will live in cities by 2030. The infrastructure required for this lop-sided growth of the cities is resulting in mountains of garbage collecting in the unplanned extensions in larger cities, because of poor conservancy services and lack of civic amenities. It is estimated that the domestic garbage produced per day in Mumbai is of size of an eight stored building complex. The quality of air in the surroundings of the cities is so poor that it is estimated about two million children under five die each year from respiratory infections Falling in line with the general situation, we find certain public places like hospitals, vegetable, fish and other market places, Railway stations, Bus stands, Parks and Cinema halls are maintained unhygienically contributing to the spread of infectious diseases. It is wonder how the elite like doctors and higher officials who work in such public places and spend major part of their day time in these places are callous to the environment. Particularly, hospitals generate an enormous amount of dangerous waste. The amount of solid waste generated by hospitals has been increasing rapidly in developing countries like India and its management can no longer be ignored. Increasing concern for community health standards and pollution control requirements demand that the huge mass of infectious waste be rendered as harmless as possible before it is disposed. Against this background, an attempt is made in this paper to discuss the problem of disposal of wastes in Indian hospitals and various legislations relating to environmental protection in general and Biomedical waste (Management and Handling) rules, 1998 (amended in 2000) based on the environmental (protection)Act, 1986 in particular. This Paper also suggests a few measures for the effective management of waste disposal. The objectives of this study were: (i) to assess the waste handling and treatment system of hospital bio-medical solid waste and its mandatory compliance with Regulatory Notifications for Biomedical Waste (Management and Handling) Rules, 1998, under the Environment (Protection Act 1986), Ministry of Environment and Forestry, Govt. of India, at the chosen KLE Society's J. N. Hospital and Medical Research Center, Belgaum, India and (ii) to quantitatively estimate the amount of non-infectious and infectious waste generated in different wards/sections.

INTRODUCTION

This topic an attempt made to study background of E-waste Management in India and Mumbai. More over this topic also presented the study, Hypotheses, Scope, Significance and Limitations of the study. In addition to Research methodology and summary. This chapter emphases on understanding the basics of research topic and concepts from various perspectives viz. social, technical, environmental and economical etc. The objectives of this chapter to put on light on area under research. It also focuses on the scope, objectives and in short research methodology adopted to complete study on given topic. The splurge of technology in the last two decades results in e-mail, e-business & e-commerce. The most modern expression to gain the 'e' prefix has a more questioning separation - waste. Electronic & Electrical Waste which is universally called as 'e-waste' is the latest consequence of the technology driven society. In this part it does not considered scrap electronic mails, but actual presence of electronic parts i.e. which is tangible, touchable which is a either part of electronic and electrical products or whole systems in itself. Our generation has experienced and gone through the transformation of variety of electronic products and their range. We have so much dependent on these electronic products and which leads to a new environmental challenge electronic and electrical waste nothing but 'e-waste'. "Part of it broad and emergent array of e devices like day to day family or domestic products such as fridge, coolers, cell phones audio systems, user electronics and computers related systems. Electronic and electrical waste is dangerous, and it is multiplied at alarming

rate P a g e | 14 as users are discarding it at exponential rate. Part of it over thousands different materials, which are not only fatal but creates dangerous pollution once discarded improperly. These toxic materials include Plastics Mercury, Lead, Bromides, and other hazardous oxides etc.". A different explanation for Ewaste is the outcome of the process when different communities throw away or handover their electronic or electrical appliances for recycling or get rid of it. E-waste includes Television sets, Personal gazettes. Music Systems, CD Players, VCRs, shooting or photographic devices, communication devices, photocopiers, Fax machines and Mobiles, audio frequency equipment's, Video Games and other household electronic equipment's. Good number common types fall under this kind of waste are cathode ray tubes (CRTs) and Personal computers. What really matters in differentiating these waste into any other solid waste are its toxicity, variety and complexity in actual components. All these categories of waste include a very high and low value of dangerous and poisonous materials like Cadmium, lead (Pb), Mercury (Hg) & higher percentage of Plastic products. In additional to above one more common part plays vital role in e-waste which is printed circuit boards (PCBs) it contain lead (pb) and bromine flame retardants (BFRs). The above materials are not only carcinogenic to human life but dangerous to environment as well. In today's globalized village concept these items are convincingly tagged, and their numbers are exponentially multiplying day by day as larger part of the developed society can afford it. As electronics are available at affordable prices, so the replacement rate has also increased, with the speed of technological innovation and development they offer tremendous functions, in lesser sizes and attractive aesthetics.

During the study, it was observed that: (i) the personnel working under the occupier (who has control over the institution to take all steps to ensure biomedical waste is handled without any adverse effects to human health and the environment) were trained to take adequate precautionary measures in handling these bio-hazardous waste materials, (ii) the process of segregation, collection, transport, storage and final disposal of infectious waste was done in compliance with the Standard Procedures, (iii) the final disposal was by incineration in accordance to EPA Rules 1998, (iv) the non-infectious waste was collected separately in different containers and treated as general waste, and (v) on an average about 520 kg of non-infectious and 101 kg of infectious waste is generated per day (about 2.31 kg per day per bed, gross weight comprising both infectious and non-infectious waste). This hospital also extends its facility to the neighboring clinics and hospitals by treating their produced waste for incineration.

1.1 PROBLEM STATEMENT

"As end users and buyers in budding and transforming nations, like India, amplify their utilization of automatic and wired products, it is but obvious these products are finding out in disposal area or part of disposing system. Due to this collection, handling & treatment in short management of such part of solid waste is a huge challenge ahead of municipal agencies, creators & buyers. And this would push to ponder what really happens to discarded products when it reaches to any such waste management activity.

1.2 Research Questions

E-waste is not only a developed countries problem but also a concern area for developing and under developed world. E-waste problem can only be tackle by knowing it thoroughly, educating users about their ignorance attitude towards electronic garbage, by taking proper steps and by joining global hands to reduce its repercussions.

II. LITERATURE SURVEY

2.1 Hospital waste disposal

The data collected by primary sources are check manually and efforts are made to remove any errors, incomplete or illogical responses and then data is coded and converted into tabular and graphical format with the help of spreadsheet application. The data was segregated on the basis of their demographic profiles, buying patterns and habits of discarding after end of their useful life or on other reasons of discarding. Further the data was interpreted and analyzed with the appropriate analysis tools like Pearson's Coefficient to establish correlation between variables. To understand the relationship between dependent and independent variables regression and correlation both techniques were used. The ANOVA is used to check the dependency of independent variable (right individual practices) and dependent variable (minimization of e-waste). ANOVA is preferred to inspect the dependency of samples on demography or not. If the results were in favor of demographics, then it indicates the different factors in demographics leads to different outcome as their practices differ with respect to e-waste and its management. The research was followed by findings, suggestion in terms of a waste management practices and had also identified the further scope for the research in this area.

2.1.1 Introduction

This development and transition phase started long

back, it means the products where purchased during few past years are now lined up in the scarp or disposal system. And this older heavy products plus newly discarding products are only increasing pressure and toll on the municipalities and other government controlling bodies in all developing and under developed nations. The transition in technology, its haphazard use and increase in purchasing power helps to increase this problem up to much non-imaginary level. The problem is not only about its compilation but it is more complex at the management and discarding part due dangerous in built materials which is not in case of solid waste management. And due to this a large amount of investment is also required to handle and properly work on this problem so many governing bodies and municipalities are reluctant to provide proper treatment to this environmental damaging and ever increasing problem. No discrete law is made on this type of waste in India and even now it is fall part of Harmful or Perilous Waste rules. Repetitively, electronic waste also largely held by people in the tolerant sector. At present, many nations facing beneath fates: • Store it and expect treatment • use it as a landfill or send to incineration • Use again and again specially after repair • Reprocessed at reprocessing services in different areas • Reprocessed in jails or in detention centers • Distributed to budding nations like India. (India is the largest importer of e-waste due to its IT business, high population and low labor cost).

2.2 Comparative performance of Hospital waste Disposal with another management system

2.2.1 Introduction

In many developing countries, the main housing practice has been through self-help, strongly propelled by massive rural to urban migration. Since the 1980s, international research and policy agendas focused more and more on a broadened habitat approach and attention for self-managed house construction gradually declined. Yet, self-help housing is still a widespread phenomenon, although mostly unattended or even ignored by governments. This thesis stresses the importance of self-help housing and makes a plea for a revaluation of 'assisted self-help' as part of national and local housing policies. In view of the urgency of the urban housing question, new pro-poor housing policies are to be developed that actively support self-build initiatives. Assisted selfhelp housing has to be put central on the urban development agenda.

2.2.2. Objectives of the Study

"The purpose of this research is to understand, identify and to amplify in depth knowledge about the waste management practices of finished electronic products. It also focus on their disposal of end-of-life appliances, which includes their assortment, compilation, providing finance & recycling, by the way of depiction, investigation and similarity of the widespread operations.. P a g e | 17 The research aspires to: 1.To identify the harms and opportunities of e-waste management as it is a very fast emerging threat to environment. 2.To study the e-waste management practices in India with special reference to MMR and identify its pros and cons. 3.To identify variety of regulations and policies related to e-waste management in India. 4. To collect and analyze information from all related participants like retailers, e-waste handlers, government officers and end-users who can effectively provide a helping hand to tackle this issue

2.2.3 Literature Review

The amplification of e-waste problem in India as it is prominent leader especially after the boom in Information and Communication Technology. India has witnessed and part of advancement of this transformation from many decades due to which this e-waste problem is one of the biggest problem in our country as we have no appropriate management system available since many years. But now it is the demand of an hour to establish a proper waste disposal and management system which can if not reduce but to control this ever growing

problem. India lacks special, separate and appropriate disposal system and due to this the statistical data is also not properly manage and make available to public or researcher which leads to improper environmental problems and creation of vicious circle out of it. Normal trend is to replace new product with the older one with some discount factor and it pushes to increase in unnecessary electronic demand. In the Business sectors where the electronic items are either exchange or replace on bulk basis, the same is handed over to second hand sellers. The percentage is almost near to 80. Other than business sector, sectors like academician or educational or instructive or Non-governmental organizations also rely on such outdated systems. As per projection the approximate quantity of outdated small computers spread out annually through personal and commercial activities will be around 1.30 million.

2.2.4 International Status:

The EPA (Environmental Protection Act) estimates that around 31,000,00 desktops and 13,000,00 portable computers were thrown away in 2007-08. It means approximately 113 k PCs were thrown away per day. The EPA further projected that approximately 32 screens were thrown away in 2007-08. Report published in 2006, EPA also mentioned approximately 399,00,000 elements find a way into scarp system annually. P a g e | 20 Environmental Protection Act also projected in next year i.e. in 2008, 317,00,000 tons of electronic waste in the United States of America alone was generated where rate of recovery was approximately 17% only. And the remaining was discarded through the blast furnace way which again produces air pollution and leads to dangerous repercussion. The non-discarded through proper way not only create management problem but the elements present into those parts like leads, mercury, cadmium start reacting with exposed environment and develops serious issues. Electronic waste considered as exponentially multiplying waste area and its proper management is very important and principal priority around the globe. Approximately additional 51,00,000 tons produced or sidelined annually and leads to dumping places act can be use to just fill lands. Discarded electronic items contain approximately 8.2% of the solid waste in wealthy nations. Around the globe maximum 20% of such waste is gone through or pass through proper channel whereas rest is either sell it to budding or poor countries or deserted to nations like Nigeria, Bangladesh, India and other many south Asian or African nations. After knowing the national and international scenario it is very imperative to undertake study, especially when Mumbai (local region – Study area) is ahead in all e-waste related problems. There are various different studies had been conducted in different part of globe but none is conducted in India by addressing this problem from stakeholders and related concerns. This study address the local and problems related to e-waste and its management which also reflects in other parts of our country from various viewpoints to understand the current practices and their impact on society in specific and environment in general. This study also helps to future researcher not only in the field of environment and management but also in addressing legal and technical aspects of E-waste. Pag

2.2.5 Research Methodology

Scientific methodology was used in research work done for studying the E-waste management. The Research design stipulates the details - the nuts & bolts-of implementation. The research design of this study involved the following components. 1.Designing the descriptive and exploratory part. 2. Specifing the sampling process & sample size. 3. Defining the information needed, Measurement scales & scaling procedures. 4.Construction & Pilot testing of questionnaire. 5. Data collection and data analysis.

2.2.6 Questionnaire development & Pretesting of Questionnaire

A questionnaire in this study used to ask number of questions to respondent one to one basis to convert their responses after codification in a statistical form of information related to e-waste management. The questionnaires used here is technically sound and presented in a lucid manner. The language used is simple English so the respondent understands the crux of the questions so to reduce the normal errors occurs during any surveys. It has proved to be effectual way of congregation information more accurately ultimate for huge samples and that too from a large geographic area. Questionnaire tool proved to be helpful for several reasons: i) Questionnaires were cost effective. This was principally accepted as when such huge population is under study researcher has to focus on its monetary constrains so not to increase its research budget. ii) In order to convert hardcopy date i.e. survey data in the form of questionnaire to soft copy format to go for further statistical analysis it is very necessary to keep questions free from any bias and as simple as it can be. iii) The survey trough questionnaire method is people's friendly and maximum population is aware of this particular technique, which make respondent very comfortable and not worried or anxious. iv) In this method of primary data collection researcher is less involved so bias related to the topic gets automatically reduced. This helps in reduction in errors during analysis step.

2.2.7 Summery

Economic growth should not be directed at the cost of compromising the environment otherwise the entire globe will have to face its dreadful repercussions. Due to lack of an advanced & efficient electronic waste management system in the country, some protocols for workers involved in disposal of e-waste have to be there. It is tough to effectively deal with e-waste management globally until a universally accepted definition of e-waste is framed. In India there are legal, technological as well as organizational challenges associated with e-waste managing. Poor and loose environmental procedures and low economic development allows and promotes easy flow of hazardous wastes in to the environment. Socioeconomic factors, infrastructure deficiencies and inadequate legal provisions hinder proper e- waste management in the country. Increased attention is required towards bringing e-waste into reuse, recycling and recovery. Consumers also need to be educated and made aware of the issues as their attitude and behavior will play a significant role in this problem. For creating mass consciousness among youth, such issues can be taught or discussed at school and college levels as well. P a g e | 36 For a sustainable e-waste management system, public-private partnership can play an effective role. It is extremely essential to involve informal sector for developing an effective and efficient e-waste management system but their role needs to be restricted to collection and dismantling. It is very vital to educate them about the electronic waste threats so as to reduce the occupational health hazards as well. E-waste is an environmental threat but at the same time is also a huge source of valuable constituents and resources. Since it is growing at an alarming rate all over the world, a universal approach must be taken to meet the challenge successfully. There is a need to change our attitude and behavior towards electronic goods (e-goods) and e-waste. Efforts must be put in for keeping a control on the irresponsible use of electronic products. Owing to faster changes in technology and availability of e-goods at cheaper rates, the rate of discard of old equipment's is increasing at alarming rate. Therefore, measures must be taken for manufacturing e-goods so that their work life can be extended, upgraded and recycled. This would promote sustainability and lead to a healthy and safe life while preserving the environment.

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